

NAME (as on UF ID): _____ **UF ID#:** _____
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----- CEN 4072/6070 Software Testing & Verification -----

Quiz 2 -- Spring 2017

You have 30 minutes to work on this exam. It is a "closed-book/closed-notes" test. Pay attention to point values, since you may not have time to work all 9 problems.

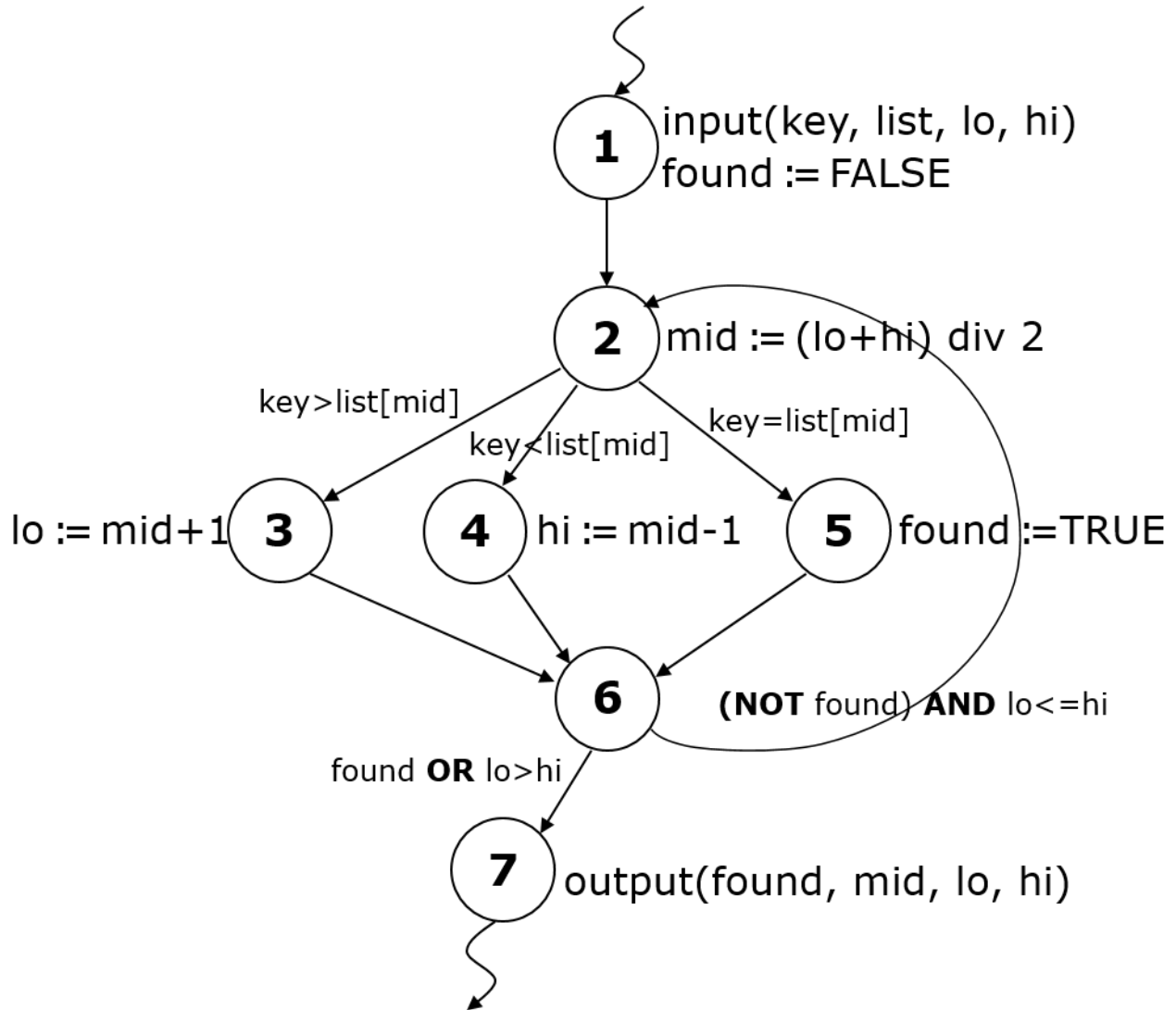
PRINT your name and UF ID# above NOW and sign the pledge at the bottom of this page, if appropriate, when you are finished.

PLEASE PRINT – **do NOT write** *CURSEVELY* – ANSWERS IN THE SPACE PROVIDED ONLY, PREFERABLY USING A BALLPOINT PEN TO INCREASE LEGIBILITY. Good luck!

On my honor, I have neither given nor received unauthorized aid on this exam and I pledge not to divulge information regarding its contents to those who have not yet taken it.

signature

The following control flow graph is the subject of all 9 problems. Note that “x **div** y” represents the INTEGER division of x by y. Thus, 7 div 2 = 3.

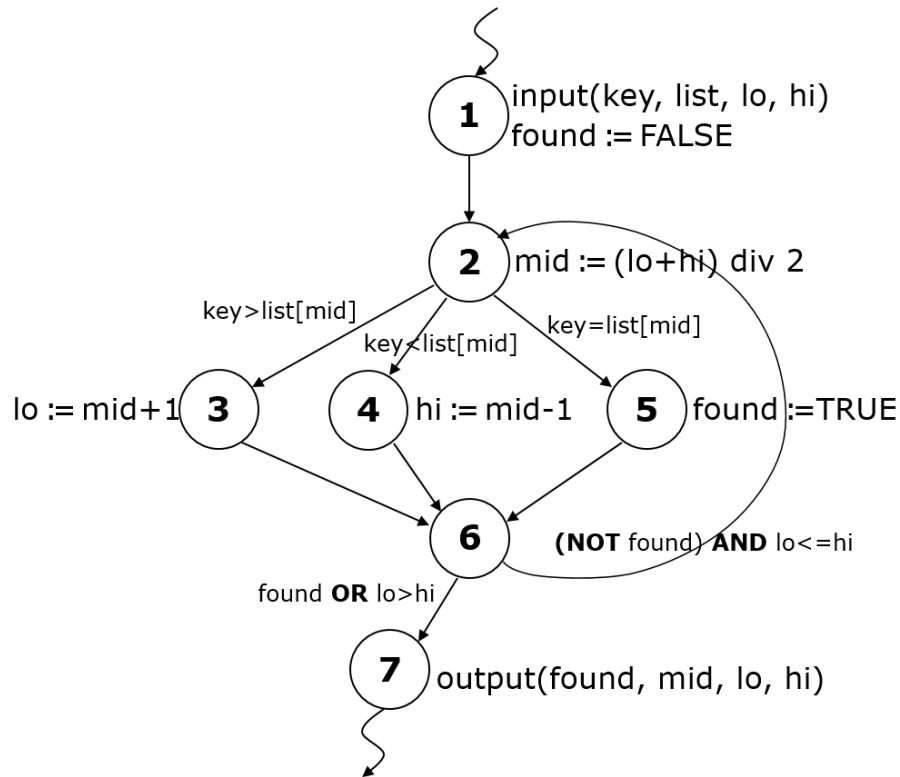


1. (10 pts.) Identify all (and ONLY) the **def-c-use pairs** and **def-p-use pairs** for variables lo, found, and mid.

lo:

found:

mid:



2. (10 pts.) For each of the du-pairs for variable **hi** listed below, identify all (and ONLY) the associated **du-paths** (feasible or not) using an expression of the form $\langle n_1, n_2, \dots, n_k \rangle$.

(1,7):

(4,7):

(1,<6,2>):

(4,<6,7>):

3. (2 pts.) Consider a test case with execution path $\langle 1, 2, 3, 6, 7 \rangle$. Circle all of the following coverage criteria that would be met by executing ONLY this test case. (Circle "none" if none would be met.)

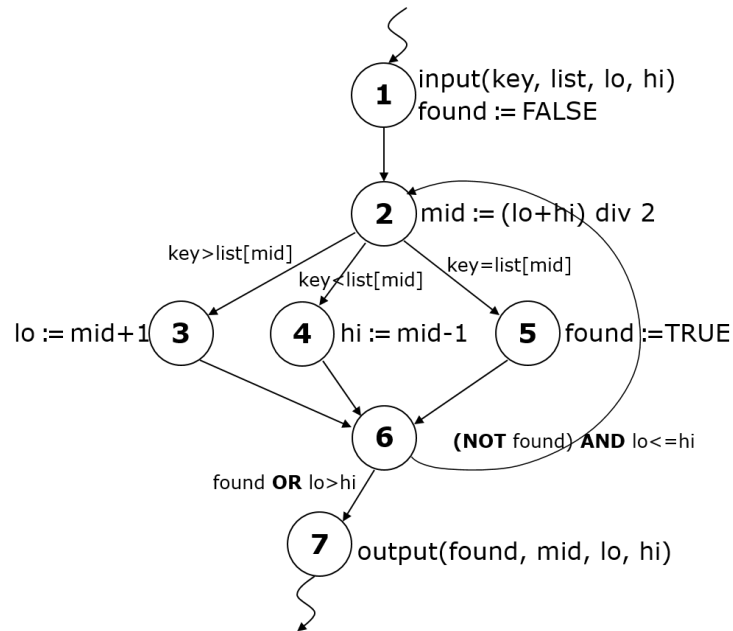
none statement branch all-defs all-uses all-du-paths

4. (3 pts.) Consider 3 test cases with execution paths $\langle 1, 2, 3, 6, 7 \rangle$, $\langle 1, 2, 4, 6, 7 \rangle$, and $\langle 1, 2, 5, 6, 7 \rangle$. Circle all of the following coverage criteria that would be met by executing ONLY these test cases.

none statement branch all-defs all-uses all-du-paths

5. (3 pts.) Consider a test case with execution path $\langle 1, 2, 3, 6, 2, 4, 6, 2, 5, 6, 7 \rangle$. Circle all of the following coverage criteria that would be met by executing ONLY this test case.

none statement branch all-defs all-uses all-du-paths



6. (9 pts.) Assume that the values *input* in node (1) of the control graph for list, lo, and hi are as follows: list[1]=*a*, list[2]=*b*, lo=1, and hi=2, where array element *a* is less than or equal to array element *b*. Give the symbolic (or actual, if discernable) values of the variables listed below along the path <1,2,3,6,2,3,6,7>. (Note that double subscripts are used where appropriate as illustrated in Lecture 9, White Box Testing Techniques III.)

(1) lo₁ =
hi₁ =
found₁ =

(3,2) lo_{3,2} =
hi_{3,2} =
found_{3,2} =
mid_{3,2} =

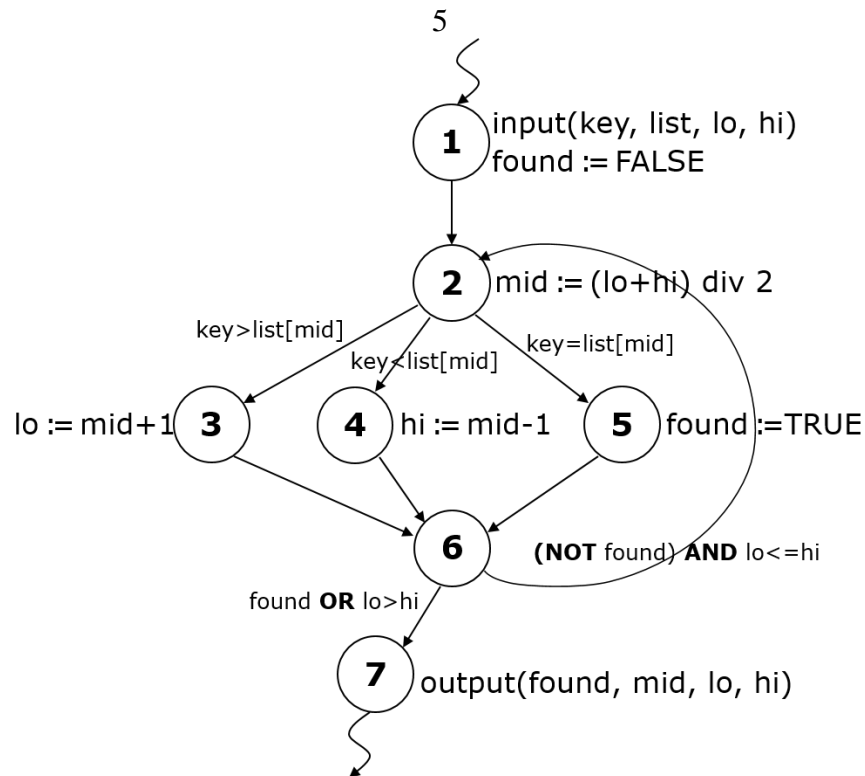
(2,1) lo_{2,1} =
hi_{2,1} =
found_{2,1} =
mid_{2,1} =

(3,1) lo_{3,1} =
hi_{3,1} =
found_{3,1} =
mid_{3,1} =

(6,1) lo_{6,1} = lo_{3,1} =
hi_{6,1} = hi_{3,1} =
found_{6,1} = found_{3,1} =
mid_{6,1} = mid_{3,1} =

(6,2) lo_{6,2} = lo_{3,2} =
hi_{6,2} = hi_{3,2} =
found_{6,2} = found_{3,2} =
mid_{6,2} = mid_{3,2} =

(2,2) lo_{2,2} =
hi_{2,2} =
found_{2,2} =
mid_{2,2} =



7. (10 pts.) Give the path condition for path $\langle 1, 2, 3, 6, 2, 3, 6, 7 \rangle$ using the appropriate symbolic values of variables *as they are encountered during execution of the path*. (Do NOT express the path condition in terms of the *initial* symbolic or deducible *actual* values of the variables – you will do this next in problem (8) by making use of your results from problem (6).) For example, if you need to represent the value of variable “X” after executing program statement k the n th time, express it simply as “ $X_{k,n}$ ”.
8. (10 pts.) Now, using your symbolic evaluation results from problem (6), give the path condition from problem (7) in terms of the *initial* symbolic (or actual) values of the variables (show ALL terms) and then simplify as appropriate.
9. (3 pts.) Give an example of input values of *key* and array *list* (i.e., elements a and b) that would satisfy this path condition.

key: _____ *a*: _____ *b*: _____